

REMARKS

This Amendment, submitted in response to the Office Action dated September 25, 2003, is believed to be fully responsive to each point of rejection raised therein. Accordingly, favorable reconsideration on the merits is respectfully requested.

As a preliminary matter, Applicant requests the Examiner to approve the drawings filed November 21, 2001. As a further preliminary matter, Applicant notes that a copy of the specification as filed by Applicant was inadvertently attached to the September 25, 2003 Office Action. Accordingly, Applicant requests that Examiner ascertain that a copy of the specification was maintained in the PTO file. Finally, Applicant has amended claims 10 and 12-15 to refer to an "apparatus" rather than a "method" to maintain consistency with base apparatus claim 9.

Turning to the merits of the Office Action, Claims 1-5, 7-12, 14 and 15, have been rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,556,214 B 1 to Yamada et al. (hereafter "Yamada") in view of JP 11-352954 to Yamaguchi Akira. Claims 6 and 13 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamada in view of JP 11-352954 and further in view of U.S. Patent No. 6,310,667 B 1 to Nakayoshi et al. (hereafter "Nakayoshi"). Applicant submits the following arguments in traversal of the prior art rejections.

The present invention relates to a monochromatic display apparatus and method. Conventional apparatus expressing a monochromatic image using sub-pixels of a main pixel must use a two driver structure to achieve separate gradation levels per sub-pixel. The case of the two driver arrangement increases the cost of the apparatus. Applicant's invention overcomes this deficiency by permitting separate gradation level per sub-pixel while using a single driver

structure. Transmission of a pixel value from one driver for one sub-pixel becomes augmented by an adding circuit in the display device, as shown by an exemplary embodiment in Fig. 2.

Yamada teaches the rudimentary aspects of image transfer and processing. Yamada primarily relates to forming a serial to parallel conversion of image data into multiple phases (Fig. 3), and for each phase of data, determining an error diffusion to diffuse error of a target pixel to a subsequent phase of data. See Abstract. In this connection, the error calculation includes delay and multiplication circuits (Fig. 8), with the delay of each unit 306-309 being different. Col. 13, lines 39-45. In addition, Yamada suggests that any diffusion patterns be alternating to avoid creation of light and dark patterns in an image. Col. 8, lines 15-31.

JP 11-352954 is described in Applicant's specification as a conventional monochrome display. In relevant part, a liquid crystal panel includes a pixel displayed by three cells 41a, 41b, 41c. A gradation converter converts gradation processing to an input image signal to provide a monochromatic image signal SO. The monochrome image SO is applied to each cell, thus each cell receives the same gradation level. Time modulation creates different time modulation stages.

The Examiner maintains that the combination of Yamada and JP 11-352954 teaches each feature of independent claim 1. The rejection is not supported for at least the following two reasons.

First, Claim 1 describes an image expressed by a number of steps of gradation for one sub-pixel being different from that for other sub-pixels. The JP 11-352954 reference relates to applying a common gradation value to all cells 41a-c of a pixel. The common use of a gradation

value does not provide a number of steps of gradation for a sub-pixel different from another sub-pixel as claimed. To the extent that time modulation provides further gradation, Applicant discerns that even under these circumstances, the sub-pixel cells still share a common gradation. There, claim 1 is not anticipated. Independent claim 9, reciting similar features, is patentable for similar reasons.

More specifically, in JP 11-352954 respective time amount modulation sections 12a, 12b and 12c of the time amount modulation means 12 corresponding to the respective sub-pixels 41a, 41b and 41c generate the respective cell signals Sa, Sb and Sc for the respective sub-pixels 41a, 41b and 41c. However, only the identical monochrome image signal SO is input into the respective time amount modulation sections 12, 12b and 12c.

Accordingly, Yamaguchi et al. distributes the monochrome image signal SO into the data at the same number of steps of gradation to control the sub-pixels; Yamaguchi et al. does not transfer the image data at the different number of steps of gradation among the sub-pixels as the image data corresponding to the respective sub-pixels to change it into the image data at the same number of steps of gradation after being transferred, unless the present invention.

Second, one skilled in the art would not be motivated to modify Yamada in view of JP 11-352954, as their combination would require a complete redesign of each reference. For instance, Yamada relates to error diffusion of a target pixel to multiple blocks. Part of the error diffusion imparts a delay during the error calculation. The timing of the error calculations thus described would require a redesign if combined with the time modulation provided by JP 11352954. Therefore, the references are not properly combined.

As a related matter, the Examiner's stated reasons for the combination, to increase gradation, does not appear to be supported. In spreading out errors across different pixel elements, Yamada does not appear to be concerned with maintaining or even increasing gradation representations. Yamada appears to be more concerned with overall visual appearance rather than resolution improvements brought about by increased gradation. See Yamada col. 8, lines 20-23. In this connection, it would appear that the time modulation at 4 stages suggested by JP 11-352954 would contradict an object of improving viewability of an image. The time modulation in four stages would introduce a source of cyclic flicker in Yamada. Therefore, Applicant would maintain that the references may not be properly combined.

Applicant would further submit that the Examiner's reference to JP 11-352954 by page, paragraph and line number are not understood in relation to the document submitted in the IDS of February 27, 2002. If the Examiner is referring to a different version of JP 11-352954, such as an English translation thereof, Applicant would request the Examiner to forward a copy of this translation.

Claims 2-8 and 10-15 are patentable based on their dependency. With further regard to claim 2, the Examiner's rejection is inconsistent with the rejection of claim 1. With regard to claim 1, the Examiner conceded that Yamada did not teach a sub-pixel with the different number of steps of gradation being different between one sub pixel and other sub pixels. The Examiner cannot then contend that Yamada teaches the differential of sub pixel values described by dependent claim 2. Claim 10 is patentable for similar reasons.

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With regard to claim 3, the representation of image data provided by the monochrome display adding a bit to image data of one sub-pixel is not taught or suggested by the art.

With regard to claims 7 and 14, these claims describe one video card to drive multiple displays. The Examiner has not addressed the many to one aspect of the claims. To the extent that the Examiner relies on the additional texts mentioned at page 5, the Examiner is requested to formally apply the texts in a non-final rejection and supply such references so that Applicant may respond to the rejection.

With regard to the obviousness rejections of claim 6 and 13, Nakayoshi does not correct the deficiencies of the primary combination.

Applicant has added claims 16-18 to describe features of the invention more particularly.

In view of the above, Applicant submits that claims 1-18 are in condition for allowance. Therefore it is respectfully requested that the subject application be passed to issue at the earliest possible time. The Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary.

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